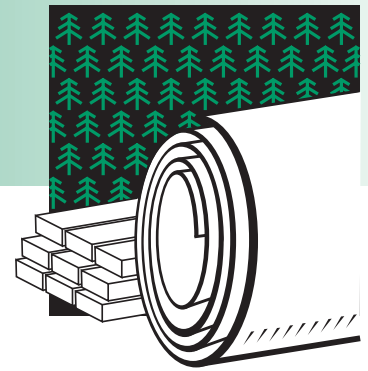


# FOREST PRODUCTS

## Project Fact Sheet



## PARTICLE SIZE REDUCTION IN WASTEWATER TREATMENT

### NOVEL PARTICLE SHEARING DEVICE REDUCES SUSPENDED SOLIDS IN ACTIVATED SLUDGE AND SIGNIFICANTLY REDUCES ENERGY CONSUMPTION

#### Benefits

- Could save 129,000 kWh of electricity annually for treating 5000 pounds/day of sludge
- Could save 1.71 million kWh annually by 2010
- Reduces sludge/solid waste by more than 2900 tons/year/unit
- Reduces CO<sub>2</sub> and methane emissions by 51 tons/year/unit
- Reduces dewatering chemical usage by reducing sludge quantities
- Reduces landfill requirements from reduced sludge quantities
- Increases the life span of existing sludge treatment facilities from reduced sludge processing needs

#### Applications

The pulp and paper industry is the primary industry to benefit from this treatment technology; but the agricultural, chemical, and petroleum industries and wastewater treatment will benefit as well.

#### Project Partners

NICE<sup>3</sup> Program  
Washington, DC

Eastern Paper Company  
Lincoln, ME

KADY International  
Scarborough, ME

Maine Department of Economic  
and Commercial Development  
Augusta, ME

Maine Manufacturing  
Extension Partnership  
Portland, ME

University of Maine  
Department of Industrial Cooperation  
Orono, ME

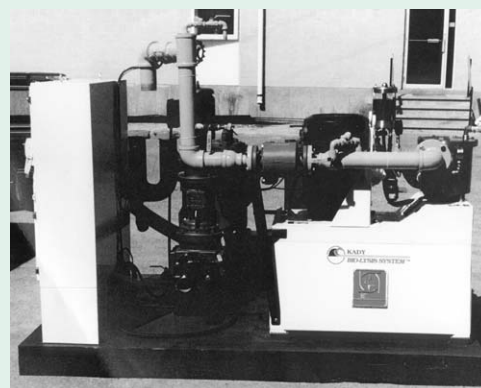
The activated sludge process - a conventional aeration system for treating sludge - uses large amounts of energy while often failing to keep up with the demand for dissolved oxygen. The cost to upgrade these systems can be prohibitive. The KADY Bio-Lysis Systems enhances the existing aeration process by applying mechanical forces, including cavitation, to reduce the median floc size. As a result of this process, aeration required to produce a fully oxygenated biomass was reduced. This reduces the amount of energy used as well as reducing emissions and waste sludge production.

#### Project Description

**Goal:** Demonstrate a reduction in energy costs for aerating solid pulp and paper waste using the Bio-Lysis System to serve as a basis for future market development.

The Bio-Lysis System contains a specially designed spinning rotor inside a stationary stator, which disrupts the microbial cell membranes in wastewater sludge. Particulate matter is disrupted through violent hydrodynamic cavitation, with the rotor acting as a centrifugal pump to force material through radial rotor slots at 9700 ft/min. The Bio-Lysis System operates with low viscosity, yet generates 120 times more fluid shear on material that has 200% to 400% more floc particles than typical waste, and achieves particle disintegration in a single pass.

#### KADY Bio-LYSIS SYSTEM



A new waste-water treatment system, being developed by KADY International, effectively reduces the size of the microbial waste, thereby reducing sludge aeration requirements by 10%.



Benchscale testing showed that the aeration required to produce a fully oxygenated biomass was reduced by 10% with the Bio-Lysis System. The energy needed to treat 5,000 pounds of sludge daily was reduced by 443 million Btu/year; carbon dioxide and methane emissions were reduced by 11 and 40 tons, respectively; and more than 2900 tons/year of sludge were eliminated. KADY International, with assistance from the Maine Department of Economic and Commercial Development, Eastern Paper Company, the University of Maine, and the Maine Manufacturing Extension Partnership, will launch a production-scale demonstration program of the Bio-Lysis System with the help of a grant funded by the Inventions and Innovation Program in the U.S. Department of Energy's Office of Industrial Technologies.

### Progress and Milestones

- Acquire materials for the KADY Bio-Lysis System.
- Prepare the site, plan the demonstration, and assemble the system.
- Test the completed assembly.
- Determine the system's efficiency under actual plant conditions during the control phase.
- Issue final report.
- Conduct commercialization activities.

### Economics and Commercial Potential

This technology has the potential to reduce energy costs, improve efficiency, and reduce greenhouse gas emissions from any activated sludge process plant. Assuming 50% of waste generators ultimately adopt the Bio-Lysis System, sales in the third year following market entry are projected to be \$595,000.

This technology could save 443 million Btu/year of electricity per 5000 pound/day installation. For a typical pulp and paper mill, this could equate to a 2-million-gallon-a-day flow rate. Since a typical U.S. paper mill averages 15 million gallons a day, one mill would require on average 7.5 Bio-Lysis units. The United States has 116 such mills. First sales of the technology are expected by 2003. Based on achieving 15% penetration of the new small market by 2010, annual savings could be 143 billion Btu with 133 units installed. Market penetration of 70% by 2020 would save 303 billion Btu from 302 units.



**NICE<sup>3</sup> – National Industrial Competitiveness through Energy, Environment, and Economics:** An innovative, cost-sharing program to promote energy efficiency, clean production, and economic competitiveness in industry. This grant program provides funding to state and industry partnerships for projects that demonstrate advances in energy efficiency and clean production technologies. Awardees receive a one-time grant of up to \$525,000. Grants fund up to 50% of total project cost for up to 3 years.

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